

6.8 NETWORK DEVICES

- (a) **Modem:** A modem (Modulator DEModulator) is an electronic device that enables a computer to transmit data over telephone lines. It is a device used to convert digital signals into analog signals and vice versa. There are two types of modems: internal modems and external modems.

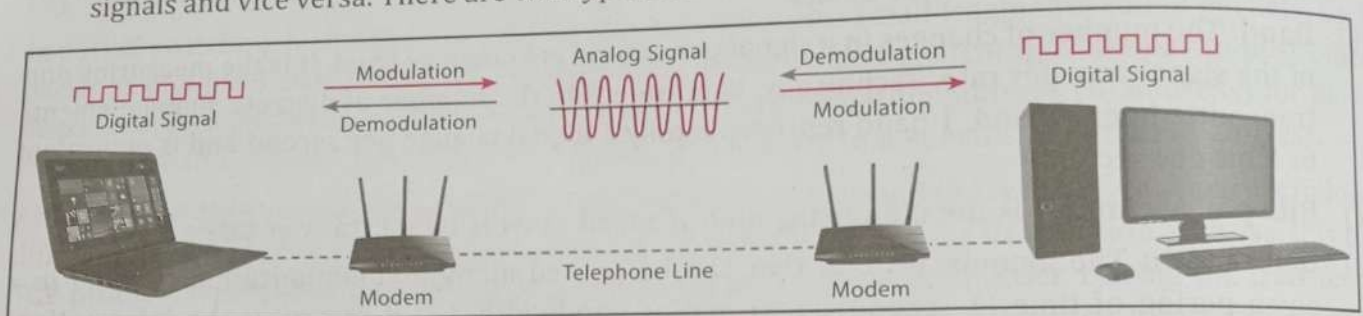


Fig. 6.8(a): Working of Modem

We know computers store and process data in terms of 0s and 1s. However, to transmit data from a sender to a receiver, or while browsing the internet, digital data is converted into an analog signal and the medium (be it free-space or a physical media) carries the signal to the receiver. There are modems connected to both the source and the destination nodes. The modem at the sender's end acts as a **Modulator** that converts digital data into analog signals while the modem at the receiver's end acts as a **Demodulator** that converts analog signals into digital data for the destination node to understand.

- (b) **RJ-45 Connector:** RJ-45 is a standard type of connector for network cables. The RJ-45 (Registered Jack) connectors are plug-in devices used in networking and telecommunication applications. They are used primarily for connecting LANs, particularly Ethernet.



Fig. 6.8 (b): RJ-45 Connector

CTM: RJ-45 is a short term for Registered Jack-45. It is an eight-wire connector used to connect computers on LANs, especially Ethernets.

- (c) **Ethernet Card:** It is a hardware device that helps in the connection of nodes within a network. Ethernet card is also known as a network card, network adapter or NIC (network interface card). It is a card that allows computers to communicate over a computer network. On Ethernet card, a physical address of each communicating computer is mentioned. Physical address is known as MAC address.



Fig. 6.8 (c): Ethernet Card

- (d) **Hub:** It is a multi-port and unintelligent network device which simply transfers data from one port of the network to another. A hub is a hardware device used to connect several computers together with different ports. When the data packet reaches one port, it is copied to all other ports of the hub without changing the destination address. In other words, it simply copies the data and broadcasts it to all the nodes connected to the hub.

Hubs can be either active or passive. Hubs can usually support 8, 12 or 24 RJ-45 ports.

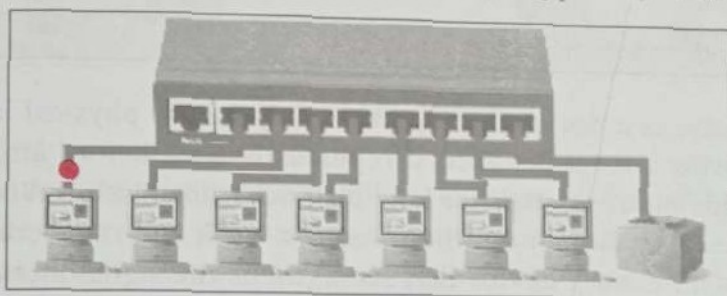


Fig. 6.8 (d): Hub

But the problem with hub is that it is not an intelligent device. It shares bandwidth with all the attached devices and broadcasts the data, i.e., sends the data packets to all the connected nodes as it does not remember devices/computers connected to it. Also, it cannot filter the data and causes unnecessary traffic jams.

A hub can both send as well as receive information but can only perform one task at a time. However, a hub is an inexpensive way to connect multiple nodes/devices to network.

CTM: Hub is a device used to connect several computers with each other.

- (e) **Switch:** A switch (switching hub) is a network device which is used to interconnect computers or devices on a network. It filters and forwards data packets only to one or more devices for which the packet is intended across a network. It is also a multi-port device but with some intelligence and so the data packets received from one port of the network are refreshed and delivered to the other port of the network. The main difference between hub and switch is that a hub replicates what it receives on one port onto all the other ports while a switch keeps a record of the MAC addresses of the devices attached to it.

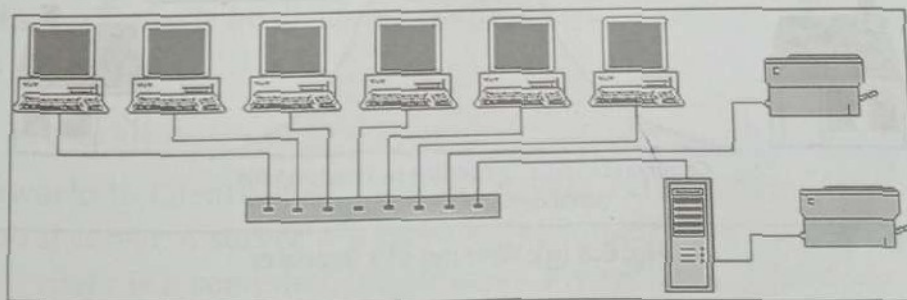


Fig. 6.8 (e): Switch

CTM: Switch is a device that transmits data to the computers in a LAN.

- (f) **Gateway:** A gateway is a device that connects dissimilar networks. On the internet, several networks communicate with each other and each network has a different configuration. In order to make reliable communication, there must be a device that helps in communicating. Gateway provides the necessary translation of the data received from the network into a format or protocol recognized by devices within the internal network.

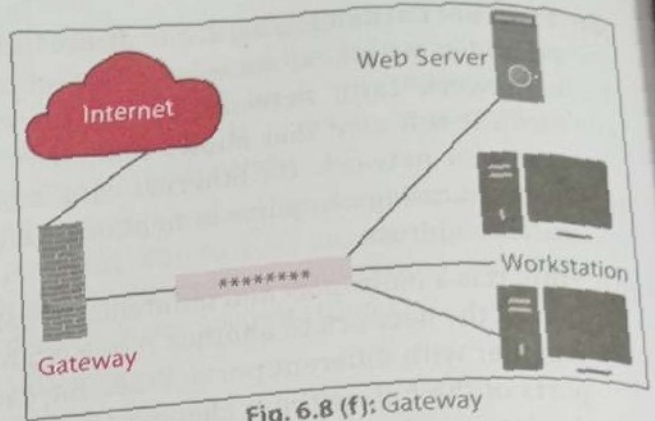


Fig. 6.8 (f): Gateway

Gateway is a device which establishes an intelligent connection between a local area network and external networks with completely different structures.

CTM: Gateway is a device that connects dissimilar networks.

- (g) **Repeater:** A repeater is a device that operates only on the physical layer of the OSI model. When a signal travels a fixed distance, a repeater is used before attenuation of the signal, which amplifies and restores signals for long-distance transmission. A repeater is an electronic device that receives a signal before it becomes too weak and regenerates the original signal. Also, it is a two-port network device that strengthens the signal intensity and connects two identical networks. In most twisted pair Ethernet configurations, repeaters are required for cable runs longer than 70 metres. A repeater does not change the functionality of the network; instead, it makes the signal strong before it degrades. Repeaters are also extensively used in broadcasting where they are termed as translators or boosters.

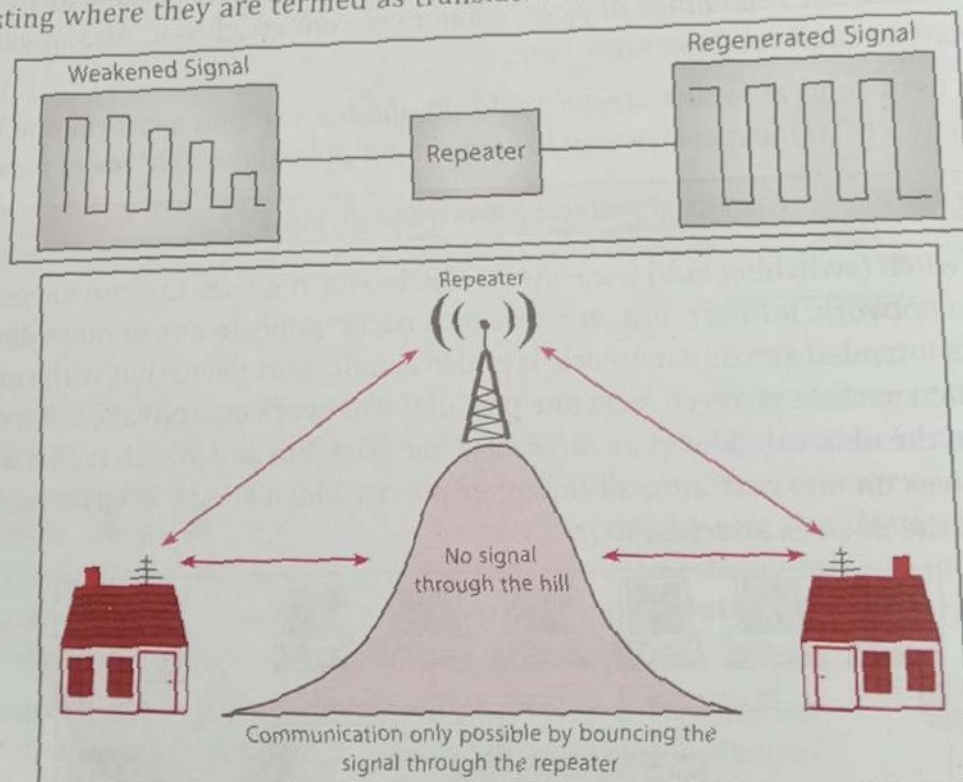


Fig. 6.3 tsl: Working of a Repeater

CTM: Repeater is a device that amplifies a signal that is transmitted across the network so that the signal received is in the same way as it is sent.

- (h) **Router:** A router is a networking device that forwards data packets from the source machine to the destination machine over a network by using the shortest path. It can handle different protocols. Routers are used at the network layer, which is the third layer of the OSI model.

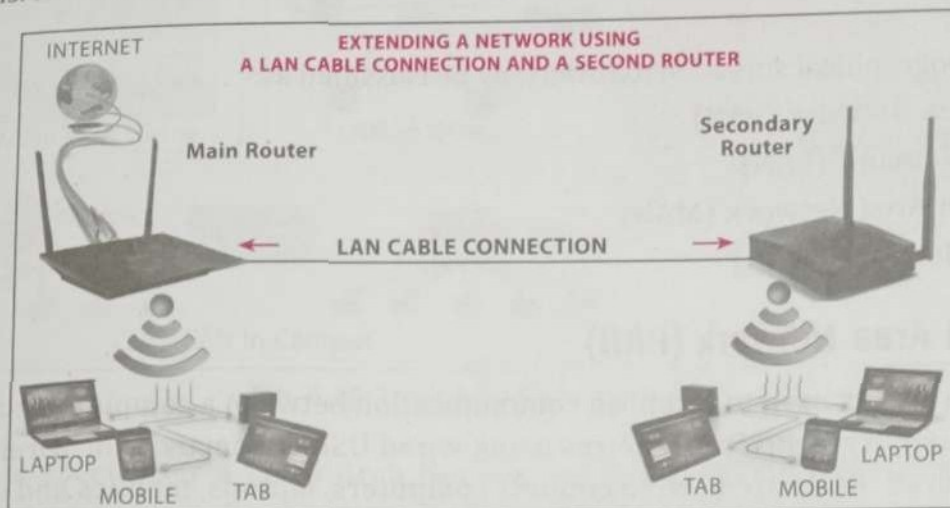


Fig. 6.8 (h): Router

A router uses IP address to connect a Local Area Network to the internet. Compared to a hub or a switch, a router has advanced capabilities as it can analyze the data being carried over a network, decide/alter how it is packaged and send it to the appropriate destination networks. For example, suppose data has been divided into packets of a certain size and these packets are to be carried over a different type of network which cannot handle bigger packets. In such a case, the data is to be repackaged as smaller packets and then sent over the network by a router.

DLN is a device that helps in packaging data for sending over a network.

- (!) **Wi-Fi Card:** A Wi-Fi card is either an internal or external Local Area Network adapter with a built-in wireless radio and antenna. A Wi-Fi card is used in a desktop computer that enables a user to establish an internet connection. Wi-Fi cards are known as wireless fidelity cards as they allow the user to set up connection without any wires. Wi-Fi cards are widely used in notebook computers due to their highly portable nature. The most common Wi-Fi card used in desktop computers is PCI-Express Wi-Fi cards which is made to fit the PCI-Express card slot on the motherboard.